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Pesticide Fact Sheet Number 74: Perfluidone

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticides and Toxic Substances
Office of Pesticide Programs (TS-766C)
Washington, DC 20460

EPA

Pesticide Fact Sheet

Name of Chemical: PERFLUIDONE
Reason for Issuance:
Date Issued: Sept. 30, 1985
Fact Sheet Number: 74

1. Description of the chemical:

Generic name: 1,1,1-trifluoro-N-[2-methyl-4-(phenylsulfonyl)-phenyl]-methanesulfonamide
Empirical formula: $C_{14}H_{12}F_3NO_4S_2$
Common name: Perfluidone
Trade name: Destun®
Chemical Abstracts Service (CAS) Registry number: 37924-13-2
Office of Pesticides Program's EPA Chemical Code Number: 108001
Year of initial registration: 1976
Pesticide type: Herbicide
Chemical family: Sulfonamide
U.S. producer: 3 M Company

2. Use patterns and formulations:

Application sites: Perfluidone is registered for control of nutsedge species, certain grasses, and broadleaf weeds in flue-cured tobacco.

Type of formulation: Perfluidone is available in a wettable powder formulation.

Types and methods of applications: Perfluidone is banded or broadcast applied to the soil surface with ground equipment as a preemergence spray.

Application rates: 1.5 lbs a.i./A on crop sites.

Usual carriers: Water.

3. Science Findings:

Summary science statements:

Perfluidone is not acutely toxic by the dermal and ocular routes of exposure. A 90-day dog feeding study showed liver disorders (hepatic lesions, hepatocyte vacuolation, hyalin degeneration and biliary stasis) at the two highest dose levels (400 and 800 ppm).

The available data are insufficient to show that any of the risk criteria listed in § 162.11(a) of Title 40 of the U.S. Code of Federal Regulations have been met or exceeded for the uses of perfluidone at the present time. There are no valid mutagenicity and teratogenicity studies for perfluidone. There are also residue chemistry and environmental fate data gaps.

Perfluidone is slightly toxic to freshwater fish species. Studies regarding freshwater invertebrates are not acceptable and there are no marine/estuarine data. A detailed ecological hazard assessment cannot be made until certain environmental chemistry data requirements have been met.

Chemical characteristics:

Perfluidone is a solid at room temperature and is odorless. Its molecular weight is 379.40. The melting point is 143-145°C. Perfluidone is soluble in water (at 20°C) to 60.0 ug/ml and soluble in aromatic and chlorinated hydrocarbon solvents.

Toxicological characteristics:

Acute toxicology effects of perfluidone are as follows:

Acute Dermal Toxicity in rabbits: >4,000 mg/kg body weight, Toxicity Category III
Skin irritation in rabbits: Not an irritant, Toxicity Category IV
Eye irritation in rabbits: Moderate eye irritant, Toxicity Category II.

Subchronic toxicology effects of perfluidone are as follows:

A 90-day dog feeding study showed liver disorders (hepatic lesions, hepatocyte vacuolation, hyalin degeneration and biliary stasis) at the two highest dose levels (400 and 800 ppm).

Chronic toxicology effects on perfluidone have not been evaluated because there are no valid teratogenicity studies in either the rat or rabbit, and no mutagenicity tests.

Major routes of human exposure:

Non-dietary exposure of applicators to perfluidone during mixing, loading, spraying and flagging is probable.

Physiological and biochemical behavioral characteristics:
Translocation: Perfluidone is mobile in the xylem but is of limited mobility in the phloem.
Mechanism of pesticidal action: Perfluidone inhibits photosystem I of the photosynthetic process.

Environmental characteristics:

Adsorption and leaching in basic soil types: Perfluidone will leach through wet, neutral or slightly alkaline soils, with a tendency toward greater leaching in soils having low clay and organic matter. Leaching occurs to a lesser extent in acidic soil.
Microbial breakdown: Soil microorganisms play a significant role in the degradation of perfluidone in the soil.
Loss from photodecomposition and/or volatilization: Photodecomposition and/or volatilization play an important role in the degradation of perfluidone on or in soil.
Average persistence at recommended rates: When used at recommended rates under normal environmental conditions, the half life of perfluidone in the soil is approximately one month.

Ecological characteristics:

96-hour fish toxicity: 147.5 ppm for bluegill sunfish (practically non-toxic) and 17.0 ppm for rainbow trout (slightly toxic).

Potential problem for endangered species:

Perfluidone was reviewed by the Agency under the endangered species cotton cluster, but it did not exceed any trigger. On flue-cured tobacco, if the maximum rate of 1.5 pounds active ingredient/acre were applied to six inches of water, the resulting residues (0.754 ppm) are less than 0.900 ppm (1/20 of the LC_{50} of the most sensitive fish). Therefore, perfluidone's use on tobacco is not expected to adversely affect the endangered species and no endangered species label statements are required.

Tolerance assessments:

The Agency is not conducting a tolerance reassessment on perfluidone because the only use is on flue-cured tobacco. This use is a non-food and non-feed use which does not require a tolerance. Therefore, the Agency will not require residue chemistry data on the metabolism of perfluidone and related metabolite(s) in crops and animals.

Problems known to have occurred with use:

Since perfluidone has never been commercially manufactured or sold in the United States, it has not been identified in the Pesticide Incident Monitoring System (PIMS) nor implicated in any incident.

4. Summary of regulatory position and rationale:

Based on the review and evaluation of all available data and other relevant information on perfluidone, the Agency has made the following determinations:

The available data are insufficient to indicate that any of the risk criteria listed in § 162.11(a) of Title 40 of the U.S. Code of Federal Regulations have been met or exceeded for the uses of perfluidone at the present time.

Perfluidone is not acutely toxic by the dermal and ocular routes of exposure. A 90-day dog feeding study showed liver disorders (hepatic lesions, hepatocyte vacuolation, hyalin degeneration and biliary stasis) at the two highest dose levels (400 and 800 ppm).

The absence of other toxicological data prevents the Agency from determining the acute, subacute and chronic effects of perfluidone. Given the lack of data, the most appropriate action is to move quickly to fill the data gaps. When data are submitted and reviewed, the Agency will determine the registrability of the affected use pattern.

The data base supporting the perfluidone tolerance on cotton seed (0.01 ppm) has been reviewed and found to be inadequate. However, the data tables in the perfluidone registration standard will not include these data gaps attributable to the tolerance on cottonseed: § 158.135 Toxicology, Subchronic Testing (82-4), Chronic Testing (83-1, 83-2, 83-4), Special Testing (85-1); § 158.125 Residue Chemistry, Livestock (171-4), Animal Residues (171-4), Cottonseed (171-4) and Meat/Milk/Poultry/Eggs (171-4). Instead, the Agency will issue a Proposed Rule to revoke the perfluidone tolerance on cottonseed. If there is no response to support the tolerance, the Agency will issue a Notice of Tolerance Revocation.

End-use product (EP) labels will be required to bear a revised environmental hazard statement

EP labels will be required to bear a rotational crop restriction.

EP labels will be required to bear a protective clothing state ment for mixers, loaders, and applicators.

Manufacturing-use product (MP) labels will be required to bear a statement regarding discharge to bodies of water and sewer systems.

The Agency will not require a ground water advisory statement at this time. If additional data indicate that perfluidone may cause ground water concerns, the Agency may reconsider this decision.

No endangered species label statements are required.

The Agency is not requiring a reentry interval for the registered use of perfluidone.

Specific label warning statement:

Hazard Information

The human hazard statements must appear on all EP labels as presribed in 40 CFR 162.10.

Environmental Hazard Statements

All MPs intended for formulation into EPs must bear the following statements:

"Do not discharge effluent containing this product directly into lakes, streams, ponds, estuaries, oceans or public waters unless this product is specifically identified and addressed in a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the Environmental Protection Agency".

End-Use Product Statements

The following environmental hazard statement must appear on all EP products:

"Do not apply directly to water or wetlands. Do not contaminate water by cleaning of equipment or disposal of wastes".

The following rotational crop restriction statement must appear on all EP products:

"Limitations: Replant only tobacco in DESTUN® herbicide-treated soil during the year of application and the following crop year".

The following protective clothing statement must appear on all EP products:

"During mixing/loading or application, wear gloves impermeable to perfluidone. When handling the concentrated product, wear a dust mask and chemical resistant apron in addition to the gloves. Wash hands thoroughly with soap and water after handling and before eating, urinating or smoking. Remove and wash clothing before reuse. Clothing should be laundered separately from household articles. Replace gloves frequently. Used gloves and clothing which has been drenched or heavily contaminated should be disposed of in accordance with state or local regulations".

5. Summary of major data gaps:

The toxicological studies are required on the following dates:

An acute oral toxicity study (June 30, 1986),
An acute inhalation toxicity study (June 30, 1986),
A dermal sensitization study (June 30, 1986),
A 21-day dermal toxicity study (September 30, 1986),
Two teratogenicity studies (December 30, 1986), and
Mutagenicity studies (June-September 1986).

The environmental fate data are required on the following dates:

An hydrolysis study (June 30, 1986),
A photodegradation study (June 30, 1986),
An aerobic soil study (December 30, 1987),
A mobility/leaching study (September 30, 1986), and
A dissipation/soil study (December 30, 1987).

The ecological effects data are required on the following dates:

An acute avian oral toxicity study (June 30, 1986),
Two avian subacute dietary toxicity studies (June 30, 1986),
Two freshwater fish toxicity studies (June 30, 1986), and
An acute freshwater invertebrate toxicity study (June 30, 1986).

Product chemistry data are required during 1986.

6. Contact Person at EPA:

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